

YIELDABLE PROP

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part of United States Patent Application bearing Serial No. 10/371,377 filed February 21, 2003 which claims the benefit of United States Provisional Patent Applications bearing Serial Nos. 60/359,089, filed February 22, 2002; 60/398,290, filed July 24, 2002; and 60/402,281, filed August 9, 2002.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to mine roof props and, more particularly, to a yieldable mine roof prop having two telescoping conduits and a clamp assembly.

Brief Description of the Prior Art

[0003] A mine roof support system having two yielding props connected to one another by a support cross member is known. The yieldable props in the known mine roof support system each include a clamp assembly which includes a clamp having a first split conduit, a second split conduit, at least one U-shaped bolt, an arch-shaped brace, and internally threaded nuts.

SUMMARY OF THE INVENTION

[0004] The present invention generally includes a yieldable prop having a first end and a second end and includes a first hollow conduit, a second conduit slidably received in the first hollow conduit, a clamp assembly positioned adjacent to the first hollow conduit and the second conduit, and at least one handle connected to the first hollow conduit or the second conduit and the clamp assembly. The prop further includes a bearing plate positioned at the first and/or second end of the yieldable prop, wherein the bearing plate defines a planar shape, a volcano shape, a C- or I- cross sectional shape, or some other suitable shape.

[0005] The first conduit has a first length, the second conduit has a second length, and the first and second lengths are chosen as a function of seam height and desired overlap of the first and second conduits. The clamp assembly according to one embodiment of the present invention includes a first split conduit defining a first inner surface and a first outer surface, a second split conduit defining a second inner surface and a second outer surface, at least one U-shaped bolt having a U-shaped portion and two threaded legs, and a brace defining first and second leg orifices. Threaded nuts are also

included, wherein the internally threaded nuts are individually received on a respective threaded leg and are torqued to approximately 300 foot pounds.

[0006] The first split conduit may further include friction members along the first inner surface, wherein the friction members are tack welds. Second and third embodiment assemblies may include a wedge and a wedge housing or one or more compressible sleeves. The prop may contain a visual tension indicator, such as a chain connected to the first hollow conduit or the second hollow conduit, and one of the bearing plates. A jack assembly may be positioned adjacent to the first hollow conduit and the second hollow conduit, the jack assembly including a jack body having a first jack end, a second jack end, a fluid inlet opening, and a piston having a plunger and a piston arm. The plunger is connected to one end of the piston arm and the plunger is housed in the jack body. A second clamp assembly is positioned at the second jack end of the jack body and a base defining a first partial orifice is positioned at the other end of the piston arm, opposite the plunger. A guide defining a second partial orifice is positioned adjacent to the first jack end of the jack body.

[0007] An alternate jack assembly may include a stock base, a dowel connected to the stock base, a manual ratchet jack attached to the dowel, and a stock head connected to the manual ratchet jack.

[0008] Another embodiment of the present invention is similar to that described above except that the first clamp assembly is replaced with a second clamp assembly. The second clamp assembly includes a housing, a wedge, a bolt, and a nut. The housing is positioned around the first conduit, and the wedge is attached to an external surface of the second conduit. The wedge is configured to engage the housing to prevent the second conduit from further entering the first conduit.

[0009] The housing is preferably generally C-shaped having a pair of parallel legs extending from opposed ends of the housing. Each leg includes a bolt opening configured to receive a bolt therethrough. A nut is received on the bolt and is torqued accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Fig. 1 is a side view of a first embodiment yieldable prop according to the present invention;

[0011] Fig. 2 is an exploded top perspective view of a first clamp assembly according to the present invention;

[0012] Fig. 3 is a perspective view of the first clamp assembly shown in Fig. 2;

[0013] Fig. 4 is a top perspective view of a first embodiment jack assembly;

- [0014] Fig. 5 is a top view of a jack clamp shown in Fig. 4;
- [0015] Fig. 6 is a perspective side view of the first embodiment yieldable prop shown in Fig. 1 with the first embodiment jack assembly shown in Fig. 4 removably attached thereto;
- [0016] Fig. 7 is a side perspective view of the first embodiment yieldable prop and first embodiment jack assembly shown in Fig. 6;
- [0017] Fig. 8 is a side perspective view of the first embodiment yieldable prop and first embodiment jack assembly shown in Fig. 7;
- [0018] Fig. 9 is a side perspective view of one end of the first embodiment yieldable prop shown in Fig. 1, wherein the two conduits are telescoped together;
- [0019] Fig. 10 is partial cross-sectional view of a second embodiment yieldable prop and a second embodiment clamp assembly according to the present invention;
- [0020] Fig. 11 is a side view of a commercially available jack assembly;
- [0021] Fig. 12 is a plan view of a second embodiment guide;
- [0022] Fig. 13 is a partial top view of the second embodiment jack assembly shown in Fig. 11 fitted with the second embodiment guide shown in Fig. 12 and an offset handle;
- [0023] Fig. 14 is a partial top view of a second embodiment base;
- [0024] Fig. 15 is a plan view of a third embodiment clamp assembly;
- [0025] Fig. 16 is cross-sectional side view of a third embodiment yieldable prop according to the present invention;
- [0026] Fig. 16a is a cross-sectional side view of a wedge shown in Fig. 16;
- [0027] Fig. 16b is a cross-sectional side view of a housing shown in Fig. 16;
- [0028] Fig. 17a is a side view of another embodiment yieldable prop according to the present invention;
- [0029] Fig. 17b is a partial perspective view of the yieldable prop shown in Fig. 17a;
- [0030] Fig. 18a is a cross-sectional top view of a wedge shown in Fig. 17a;
- [0031] Fig. 18b is a cross-sectional side view of a wedge shown in Fig. 18a;
- [0032] Fig. 19a is a cross-sectional top view of a housing shown in Fig. 17a;
- [0033] Fig. 19b is a cross-sectional side view of a housing shown in Fig. 19a; and
- [0034] Fig. 19c is a cross-sectional end view of a housing shown in Fig. 19a.

DETAILED DESCRIPTION OF THE INVENTION

[0035] As shown in Fig. 1, a yieldable prop 10 according to the present invention has a first end 12, a second end 14, a first conduit 16, a second conduit 18, a first clamp assembly 20, at least one handle 22, and optional first and second bearing plates 24, 26. The first conduit 16 is preferably a cylindrical hollow pipe, such as a nominal three and one-half inch schedule 40 pipe, a nominal three inch schedule 40 pipe, a nominal three inch schedule 80 pipe, or a two and one-half inch schedule 40 pipe, defining a first outer surface 28 and a first inner surface 30, with the first inner surface 30 further defining a first inner diameter 32, and a first hollow cavity 34. The second conduit 18 is preferably also a cylindrical hollow or solid pipe having a second outer surface 36 which defines a second outer diameter 38. Both the first and second conduits 16, 18 are each preferably made from metal, such as steel, having a wall thickness of approximately 1/8 to 3/4 inch. The handle 22 is preferably attached to the first clamp assembly 20 and the first conduit 16 to help prevent the clamp assembly 20 and the prop 10 from becoming disassembled during shipping or handling.

[0036] The second conduit 18 is slidably positioned in the first hollow cavity 34 defined by the first conduit 16 in a telescoping relationship. Therefore, the second outer diameter 38 of the second conduit 18 is less than the first inner diameter 32 of the first conduit 16.

[0037] Although cylindrically-shaped conduits (pipes) are preferred, alternatively-shaped conduits are also contemplated. Moreover, for reasons discussed below, it has been discovered that a first length L1 and a second length L2 should be selected as a function of seam height to obtain maximum benefits and allow for maximum overlap of the first conduit 16 and second conduit 18 when the conduits are fully nested together.

[0038] The first clamp assembly 20 is positioned adjacent to the second outer surface 36 of the second conduit 18. As shown in Figs. 1 and 2, the first clamp assembly 20 preferably includes a first split conduit 40 defining a first split inner surface 42 and a first split outer surface 44, a second split conduit 46 defining a second split inner surface 48 and a second split outer surface 50, and at least one bolt 52 having an outer surface compatible with an outer shape of the conduit used. Because cylindrically-shaped conduits are shown, the bolt 52 has a U-shaped portion 54 and two threaded legs 56. A brace having an outer surface compatible with an outer shape of the conduit used, such as an arch-shaped brace 58, defines first and second leg orifices 60, 62 (Fig. 2 only). Two internally threaded nuts 64 individually engage each threaded leg 56, and hardened or

frictionless washers (not shown) may also be used in conjunction with the threaded nuts 64. The frictionless washers aid in torquing the threaded nuts 64. The first split conduit 40 and the second split conduit 46 are each preferably made from metal, such as steel, having a thickness of approximately 1/8 to 3/4 inch. The U-shaped bolt or bolts 52, the arch-shaped brace 58, and the internally threaded nuts 64 are also preferably made from metal or other suitable material.

[0039] As shown generally in the combination of Figs. 2 and 3, the first split inner surface 42 of the first split conduit 40 and the second split inner surface 48 of the second split conduit 46 are each respectively positioned partially around the second outer surface 36 of the second conduit 18. The U-shaped portion 54 of the U-shaped bolt or bolts 52 is positioned adjacent to the first split outer surface 44 of the first split conduit 40. Each threaded leg 56 of each U-shaped bolt 52 extends through the respective first or second leg orifices 60, 62 defined by the arch-shaped brace 58. When the threaded nuts 64 are tightened in the conventional manner, such as by clockwise rotation, the U-shaped portion 54 of the U-shaped bolt 52 exerts a force on the first split conduit 40, while the arch-shaped brace 58 exerts a force on the second split conduit 46. In turn, the first and second split conduits 40, 46 each exert a force on the second outer surface 36 defined by the second conduit 18.

[0040] Because the first clamp assembly 20 is a combination of pieces, the first clamp assembly 20 can be vibrated loose during shipping. To solve this problem, as shown in Fig. 3, the U-shaped portion 54 of the U-shaped bolt or bolts 52 is tack welded 66 or otherwise attached to the first split conduit 40. As shown in Fig. 1, and as discussed above, a handle 22 may also be tack welded 66 or otherwise connected to both the first conduit 16 and the clamp assembly 20.

[0041] Referring to Fig. 1, the first and second bearing plates 24, 26 may be flat plates (26) welded to opposing ends of the yieldable prop 10 or non-attached, self-seating dome or volcano-type plates (24), which adjust for an uneven mine roof or mine tunnel floor or any combination herein described. Other types of bearing devices may also be used. For example, a C-shaped channel can be used to abut a roof beam. The readily detachable dome or volcano-type plates are advantageous because they allow the prop 10 to be easily dragged or otherwise handled within the cramped confines of a mine tunnel. Weight of the prop 10 is also reduced.

[0042] Because the yieldable prop 10 is adjustable in overall height due to the telescoping arrangement of the first conduit 16 and the second conduit 18, a jack assembly

68 is used to adjust the overall height or length of the yieldable prop 10. One suitable jack assembly 68 is shown in Fig. 4. The jack assembly 68 generally includes a jack body 70 having a first jack end 72 and a second jack end 74, a piston 76 having a plunger 78 and a piston arm 80, a jack clamp 82, a base 84 defining a first partial orifice 86, and a guide 88 defining a second partial orifice 90. The jack body 70 has a fluid inlet opening 92 and further houses the plunger 78 of the piston 76. The piston arm 80 is partially housed in the jack body 70 and partially extends away from the second jack end 74 of the jack body 70. The guide 88 is positioned adjacent to the first jack end 72 of the jack body 70. The base 84 is positioned at the other end of the piston arm 80, opposite the plunger 78. The second clamp assembly 82 is positioned on the piston arm 80 adjacent to the second jack end 74 of the jack body 70.

[0043] In the preferred embodiment, the piston 76 is pneumatically or hydraulically driven. When a force is exerted on one side of the plunger 78, the piston arm 80 extends away from the jack body 70. When the force is removed or if force is applied to the other side of the plunger 78, the piston arm 80 retracts into the jack body 70.

[0044] Fig. 5 shows the jack clamp 82 in greater detail. The jack clamp 82 may include a clamp plate 94, a pivot arm 96, a pivot pin 98, a hook 100, a second handle 102, and a latch bar 104. The clamp plate 94 defines a clamp orifice 106 which, referring also to Fig. 4, receives the second jack end 74 of the jack body 70 and permits the piston arm 80 to pass through the clamp plate 94. The clamp plate 94 further defines one section 108 of a partial second conduit orifice 110. The pivot arm 96, pivotally connected to the clamp plate 94 via the pivot pin 98, defines another section 112 of the partial second conduit orifice 110. The hook 100 is attached to the pivot arm 96, the second handle 102 is pivotally attached to the clamp plate 94, and the latch bar 104 is connected to the second handle 102.

[0045] When the second handle 102 is moved in a first direction, indicated by arrow A1, the latch bar 104 moves in a second direction, indicated by arrow A2, which allows the latch bar 104 to clear the hook 100. This allows the pivot arm 96 to pivot in the third or fourth directions, as indicated by arrows A3 and A4, about pivot pin 98. When the pivot arm 96 is moved in the fourth direction A4, the latch bar 104 can be positioned in engagement with the hook 100, and the second handle 102 may be moved in a fifth direction, indicated by arrow A5, thus releasably clamping the second clamp assembly 82 around the second conduit 18.

[0046] One method of installing the yieldable prop 10 will now be discussed. In an installation mode, as shown in Fig. 6, the yieldable prop 10 is positioned horizontally on a support surface 114, such as a mine tunnel floor. The jack assembly 68 is then removably connected to the yieldable prop 10 via the jack clamp 82. The guide 88 partially encompasses the first conduit 16. The base 84 is positioned adjacent to the second bearing plate 26.

[0047] As shown in Fig. 7, the yieldable prop 10 is then lifted into a perpendicular orientation with respect to the support surface 114. It is noted that the installation position of the yieldable prop 10 may be reversed, such that the first bearing plate 24 is positioned adjacent to the support surface 114.

[0048] In the orientation shown in Fig. 7, the second bearing plate 26 may be positioned adjacent to the support surface 114. Pressurized fluid, such as pneumatic or hydraulic fluid, is then allowed to enter the jack body 70. The pressurized fluid forces the piston arm 80 away from the jack body 70 and telescopes the first conduit 16 along the second conduit 18. A chain C having a predetermined length may be attached to the first conduit 16 and to the bearing plate 26 to indicate a desired extension length. It should be readily apparent to one skilled in the art that if the force acting on the plunger 78 (Fig. 4) is greater than the force required to crush or fragment the material which constitutes the mine roof or the mine floor, then the bearing plates 24, 26 will begin to be driven into the mine roof and the mine floor. To combat this effect, bearing plates having larger surface areas may be used. Also, to help combat non-symmetric loading, a dome-shaped bearing plate may also be used as discussed above.

[0049] As shown in Fig. 8, once the yieldable prop 10 has been telescoped to its desired length, the threaded nuts 64 are then torqued to approximately 300 foot pounds. The torquing of the threaded nuts 64 clamps the first and second split conduits 40, 46 (Figs. 3 and 4) around the second conduit 18 and temporarily prevents the second conduit 18 from telescoping back inside the first conduit 16. At this point, the jack assembly 68 can be removed by moving the second handle 102 of the jack clamp 82 in the manner previously discussed above, such that the latch bar 104 can clear the hook 100 and the pivot arm 96 can be pivoted away from the clamp plate 94 (Fig. 5). Once tensioned, the yieldable prop 10 will retain its original tension until a compression or loading force acts on the yieldable prop 10.

[0050] As shown in Fig. 9, as a compression load acts to compress the yieldable prop 10, such as a shifting mine tunnel roof, the clamp assembly 20 will slip and the

second conduit 18 will gradually telescope back into the first conduit 16. Further compression of the yieldable prop 10 may drive the first conduit 16 into the first clamp assembly 20. At this point, further loading may begin to buckle the first and second conduits 16, 18 or split the first conduit 16. The buckling of the first and second conduits 16, 18 can be postponed by making the first conduit 16 and the second conduit 18 substantially overlap one another. During testing, it was observed that buckling may occur at a point along the first conduit 16, where there was not an overlap of the first conduit 16 and the second conduit 18. Also, increasing wall thickness of the first and second conduits 16, 18 may help to retard buckling of the yieldable prop 10.

[0051] A second embodiment yieldable prop 10a is generally shown in Fig. 10. The second embodiment is similar to the first embodiment, with like reference numerals indicating like parts and the previous discussion regarding bearing plates herein incorporated in its entirety. However, one difference between the first embodiment yieldable prop 10 and the second embodiment yieldable prop 10a is that the first clamp assembly 20 is removed and replaced with a generally cylindrically-shaped collar 116 and one or more collapsible inserts 118a, 118b positioned between the first conduit 16 and the second bearing plate 26 or, conversely, between the second conduit 18 and first bearing plate 24 if the prop 10a is reversed. The collar 116 may have the same outer diameter as the inserts 118a, 118b or have an outer diameter which is greater than the outer diameter of the inserts 118a, 118b.

[0052] The second embodiment yieldable prop 10a is designed to be adjustable in the A6 direction, as shown in Fig. 10. The yieldable prop 10a is preferably made at a predetermined overall length which is dependent upon the distance between a mine roof and a mine floor. For the purpose of example only, a six foot high mine passageway may require a five foot, eight inch prop 10a. To help keep the various pieces together during shipping, a handle 22 may be added to the first conduit 16 and a bearing plate 26. As noted above with respect to the first embodiment yieldable prop 10, the bearing plates 24, 26 may be removable so that the handle 22 may also be connected to the insert 118b.

[0053] Installation of the second embodiment yieldable prop 10a is straightforward. The prop 10a is erected so that the first and second conduits 16, 18 are substantially perpendicular to a mine roof MR and support surface 114 or any other two opposed surfaces. Because the prop 10a is made slightly shorter than the distance between the mine roof MR and support surface 114, compressible material 120, such as wood or other suitable material, is forced between the first bearing plate 24 or 26 and the mine roof

MR so that the prop 10a is wedged snugly between the mine roof MR and the support surface 114.

[0054] If the mine roof MR shifts and applies a compression load in the A6 direction, the force of the compression load is generally transferred to the compressible material 120, the bearing plates 24, 26, the first conduit 16, the second conduit 18, and the collar 116. In turn, the collar 116 exerts a force against the insert or inserts 118a, 118b.

[0055] The collar 116 is preferably made from a durable material, such as steel. The insert or inserts 118a, 118b are preferably each made from one gauge of steel having a predetermined yield value or different gauges of steel each having individual predetermined yield values. Therefore, the inserts 118a, 118b will resist compression until the compression load exceeds the structural endurance of the insert 118a, 118b. As shown in Fig. 10, inserts 118a, 118b can be made from the same gauge steel and will therefore yield in a similar manner. Inserts 118a, 118b may also be integrally formed. If staged yielding is desired, insert 118a can be made from a thinner gauge material than insert 118b. In this configuration, insert 118a will compress before insert 118b. In compression tests, inserts made from A513 tubing and having a thickness of approximately 0.120 inch yielded when subjected to a compression force of approximately fifty tons. It has been found that the inserts 118a, 118b tend to compress rather than split, and generally each define an accordion-shaped, cross-sectional profile after being compressed. The accordion-like compression of the inserts 118a, 118b results in a cyclical resistance yield pattern. The cyclical pattern is believed to be the result of the insert contacting the conduit, the insert yielding, and insert contacting the conduit again, and process repeating.

[0056] A commercially available jack assembly 122 is shown in Fig. 11 and is modified in Figs. 12-14. The jack assembly 122 is preferably a manual jack-type support, such as the Model A9225 commercially available from SIMPLEX, Broadview, Illinois and herein incorporated by reference in its entirety. The jack assembly 122 generally includes a stock base 122a, a dowel 122b connected to the stock base 122a, a manual ratchet jack 122c attached to the dowel 122b, and a stock head 122d connected to the manual ratchet jack 122c. The jack assembly 122 is used primarily with the first embodiment yieldable prop 10, subject to the modifications shown generally in Figs. 12-14.

[0057] Fig. 12 shows a second guide 88a defining a post receiving orifice 124 and the second partial orifice 90. As shown in Fig. 13, the second guide 88a replaces the stock head 122d which is included with the Model A9225 support, with the partial orifice 90

receiving the first conduit 16. A handle 126 is also offset at an angle α with respect to centerline CL, instead of being substantially aligned with centerline CL. Similarly, as shown in Fig. 14, the second embodiment base 84a also defines a post receiving orifice 124 and a first partial orifice 86.

[0058] The second embodiment jack assembly, which is herein defined as the combination of the modified jack assembly 122, the second guide 88a, and the second embodiment base 84a, is raised and lowered by the manual ratchet jack 122c. The operation of the second embodiment jack assembly is used for substantially the same purpose as the first embodiment jack assembly discussed above, namely, the expanding of the prop 10. A hook and latch strap may be used to temporarily secure the second embodiment jack assembly to the prop 10.

[0059] As shown in Fig. 15, a first split conduit 40a defining a first split inner surface 42a and a first split outer surface 44a and a second split 46a conduit defining a second split inner surface 48a and a second split outer surface 50a can also be used with the first and second split inner surfaces 42a, 48a having friction members 128, such as tack welds, attached thereto. In this latter embodiment, it has been found that only one U-shaped bolt (discussed below) is required and the friction members 128 gouge into the first conduit 16 to help resist compression.

[0060] As shown in Figs. 16, 16a, and 16b, a wedge and housing combination 130 can also be used to provide predetermined loading. As shown in greater detail in Fig. 16a, the wedge 132 is preferably a hollow cylindrical member having a height WH and a tapered outer diameter tapering to a base level outside diameter. The wedge 132 is attached to the external surface of the second conduit 18 by hardened threads, friction, clamping, welding, or other suitable method. The housing 134, shown in detail in Fig. 16b, has a substantially static outer diameter, but includes an inner diameter that tapers to an intermediate internal diameter. A lip 136 is defined at the base level inner diameter of the housing 134, wherein the lip 136 and tapered inner diameter of the housing 134 define a race 138 that receives the wedge 132. Adjacent to the race 138, the housing 134 defines an internal cavity IC that receives second conduit 18. The housing 134 is positioned immediately adjacent to one end of the first conduit 16, and when adjusted to the desired height, prevents the second conduit 18 from substantially further entering the first conduit 16.

[0061] Referring again to Fig. 16, when the wedge 132 and housing 134 are employed, the housing 134 exerts a force on the wedge 132 and retards movement of the second conduit 18 with respect to the first conduit 16.

[0062] Another embodiment yieldable prop 10b is generally shown in Fig. 17. This embodiment is similar to the first embodiment, with like reference numerals indicating like parts and the previous discussion regarding bearing plates herein incorporated in its entirety.

[0063] In this embodiment, first clamp assembly 20 is replaced with a second clamp assembly 220. The second clamp assembly 220 is positioned adjacent to the second outer surface 36 of the second conduit 18. A ring 222 is slidably positioned around the second conduit 18. The handle 22 is attached to the first hollow conduit 16 and the ring 222 to help prevent the second clamp assembly 220 and the prop 10 from becoming disassembled during shipping or handling.

[0064] The second clamp assembly 220 includes a housing 224, a wedge 226, a bolt 228, and a nut 230. The housing 224 is positioned on top of and/or around the first conduit 16 adjacent to one end 232 of the first conduit 16. The wedge 226 engages or is attached to the second outer surface 36 of the second conduit 18. The wedge 226 is configured to engage the housing 224 to prevent the second conduit 18 from further entering the first conduit 16, as discussed above.

[0065] The wedge 226 may be configured as the wedge 132 discussed above. Alternatively, and preferably, the wedge 226 is a two piece construction including a first wedge member 234 and a second wedge member 236. The first wedge member 234 and the second wedge member 236 form a generally hollow cylindrical member having a tapered outer diameter. The first wedge member 234 and the second wedge member 236 are attached to the outer surface 36 of the second conduit 18 by clamping, welding, friction (from the housing 224), or other suitable method. The wedge 226 preferably includes a threaded inner surface 238. The threaded form 238 improves the grip of the wedge 226 on the second conduit 18.

[0066] The housing 224 has an inner surface 240 compatible with an outer shape of the conduit used. Because cylindrically-shaped conduits are typically used (as shown in the drawings), the housing 224 is preferably generally C-shaped with opposed ends 242. A pair of parallel legs 244 extend from the opposed ends 242 of the housing 224. Each leg 244 includes a bolt opening 246 configured to receive the bolt 228 therethrough. The nut 230 is received on the bolt 228 and may be torqued to a calibrated load. The bolt openings

246 may include recesses 246a for the seating of a bolt head 228a and/or the nuts 230. The calibrated load is determined by a calibration curve plotting nut torque to load (residual or maintained). The second clamp assembly 220 will not maintain 100% of the applied load to the housing 224 and wedge 226.

[0067] Because the second clamp assembly 220 is a combination of pieces, the second clamp assembly 220 can be vibrated loose during shipping. To solve this problem, a ring tie 250 is removably positioned between the ring 222 and the second clamp assembly 220 to hold the wedge 226 in an engaged relationship with the housing 224.

[0068] The prop 10 may be set by hand. Alternatively, to install the prop 10, a jack assembly 68, 122 as discussed hereinabove or another conventional jack assembly may be used. A jack interface 252 is connected to either the first conduit 16 or the second conduit 18. The jack interface 252 may be a ring configured to interact with the jack assembly.

[0069] While specific embodiments of the invention have been described in detail, it will be appreciated by those skilled in the art that various modifications and alternatives to those details could be developed in light of the overall teachings of the disclosure. The presently preferred embodiments described herein are meant to be illustrative only and not limiting as to the scope of the invention which is to be given the full breadth of the appended claims and any and all equivalents thereof.